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Aviation Weather Products in General Aviation : Interpretability and Usability Research Trends

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Aviation Weather Products in General Aviation: Interpretability and Usability Research Trends

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Presentation given at the 21st International Conference on Human-Computer Interaction, Orlando, Florida, July 2019

Agenda

- Introduction
- Current Study
- Trends
- Summary
- Conclusion

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Introduction

- General Aviation (GA) pilots have access to a wealth of aviation weather information
  - Pre-flight weather planning
  - In-cockpit weather displays
- Limited research addressing the interpretability of these weather displays

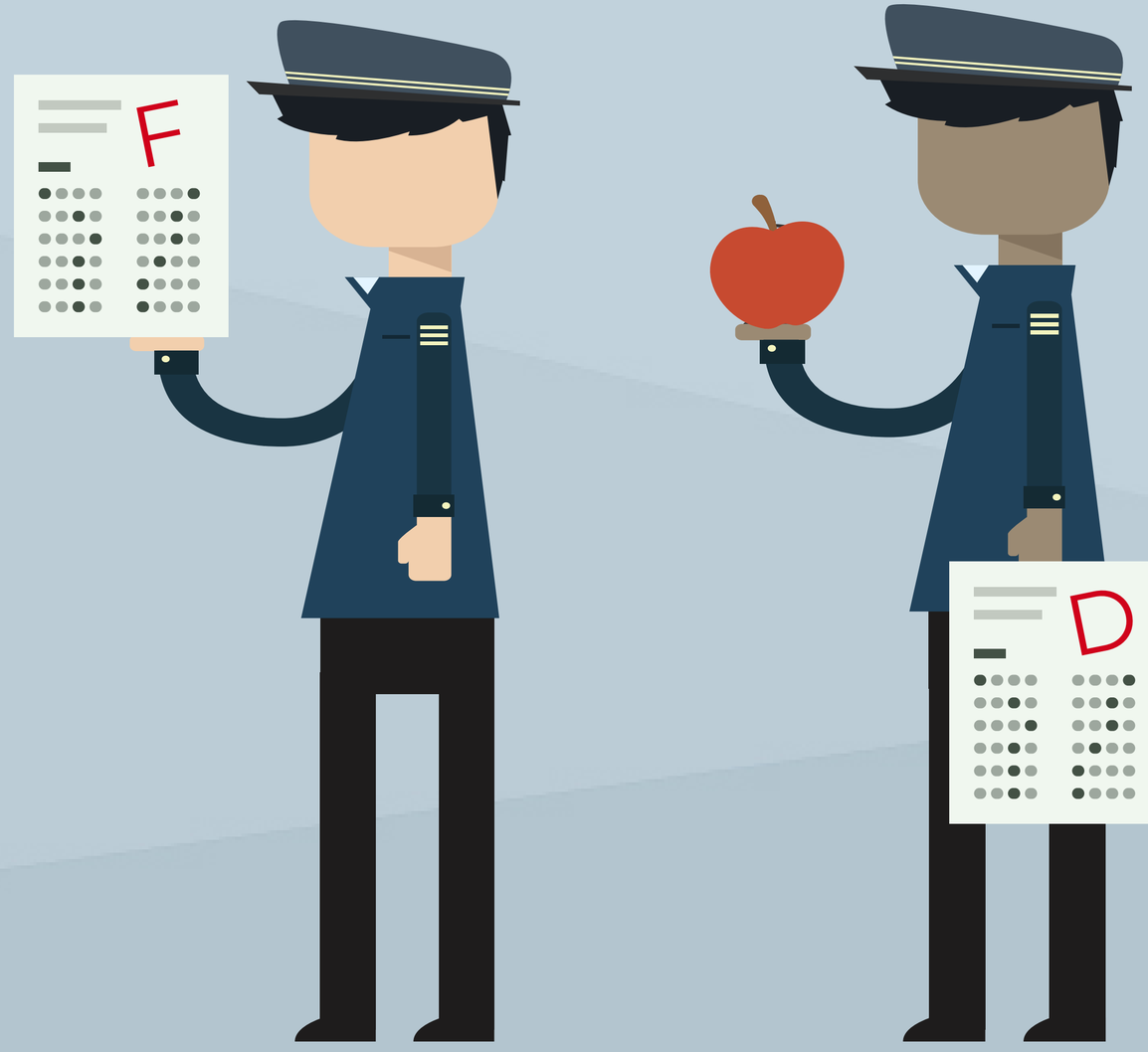
Current Study

- Study conducted by Blickensderfer et al. (2018) tested pilots' aviation weather knowledge and product interpretability
  - 5 separate tests with different products were distributed to the AOPA
  - 837 pilots fully completed the tests
- Trends found in this study will be presented

Trend 1

Flight experience has a limited effect on GA pilots' ability to interpret weather displays

- Student and private pilots scored lowest
- More experienced pilots still scored lower than 80% on average
- Weather product learnability may be low



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Trend 1

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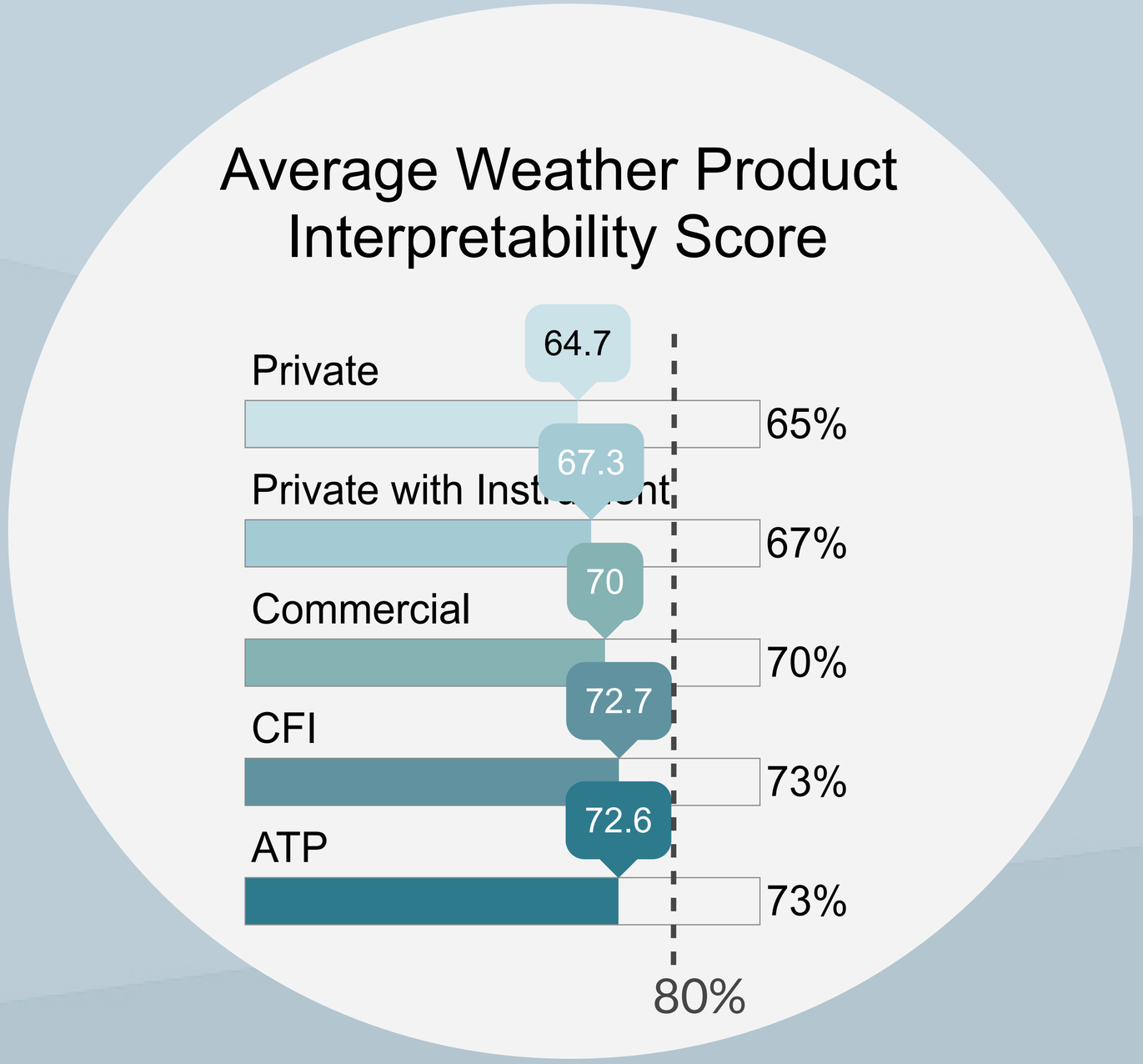

Commercial, CFI, and ATP pilots all held instrument ratings

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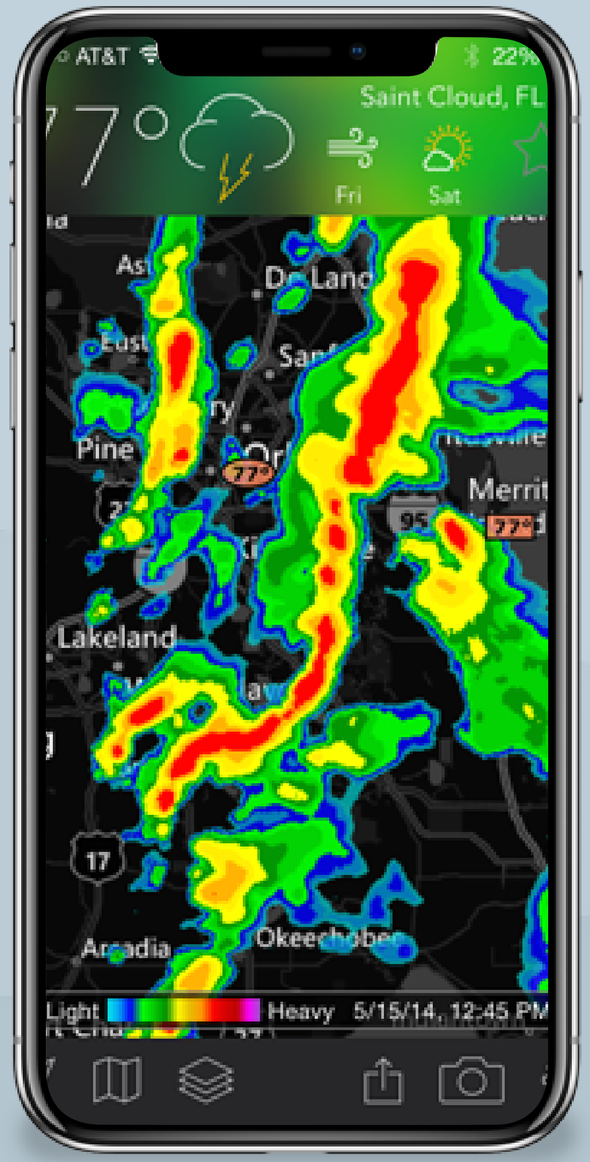
Trend 2

GA pilots do not understand Weather Radar displays

- Pilots exhibit more hazardous behavior while using enhanced radar displays (Beringer and Ball, 2004)
- Radar display questions had some of the lowest performance scores
- May provide insight into VFR to IMC incidents



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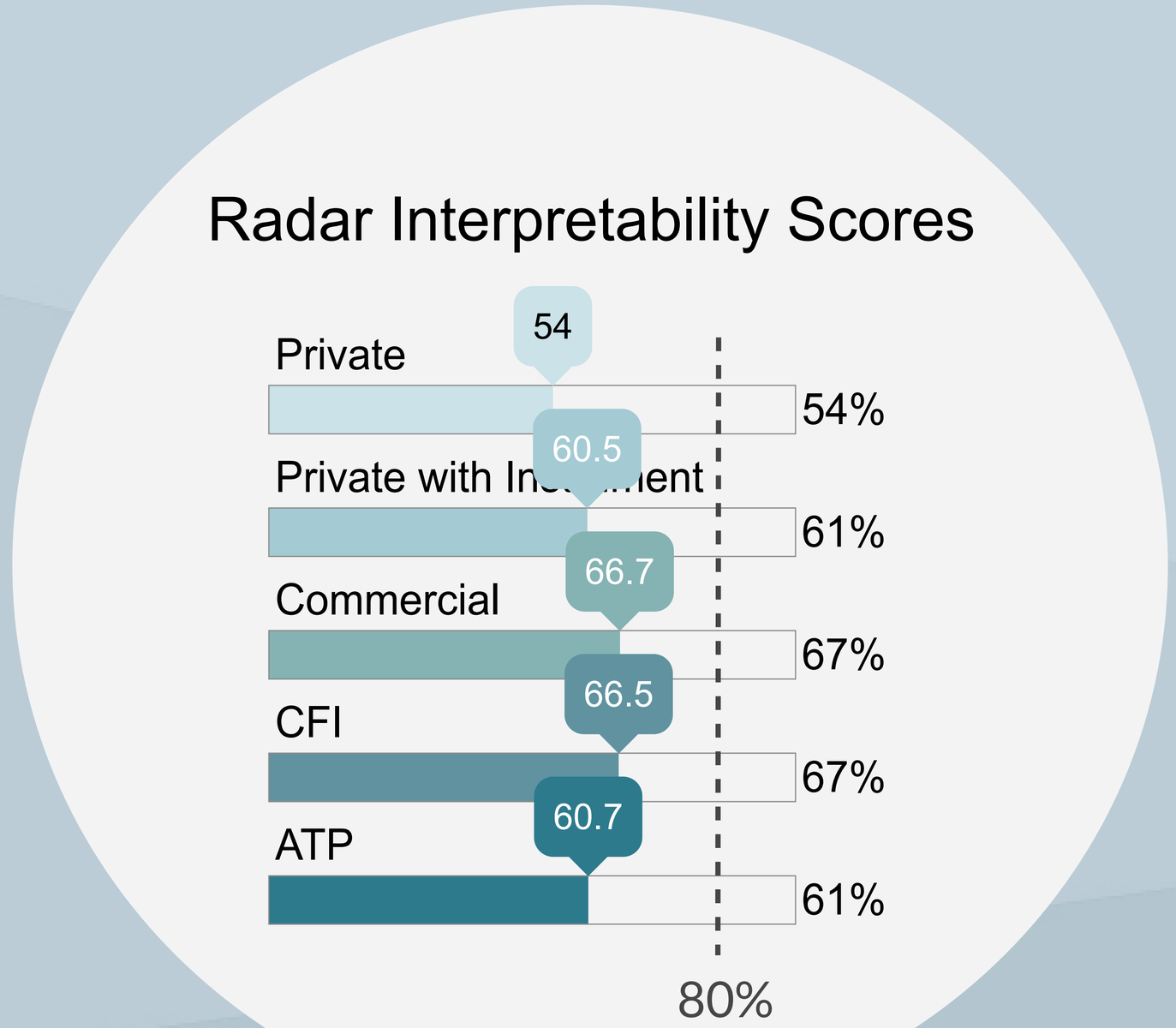

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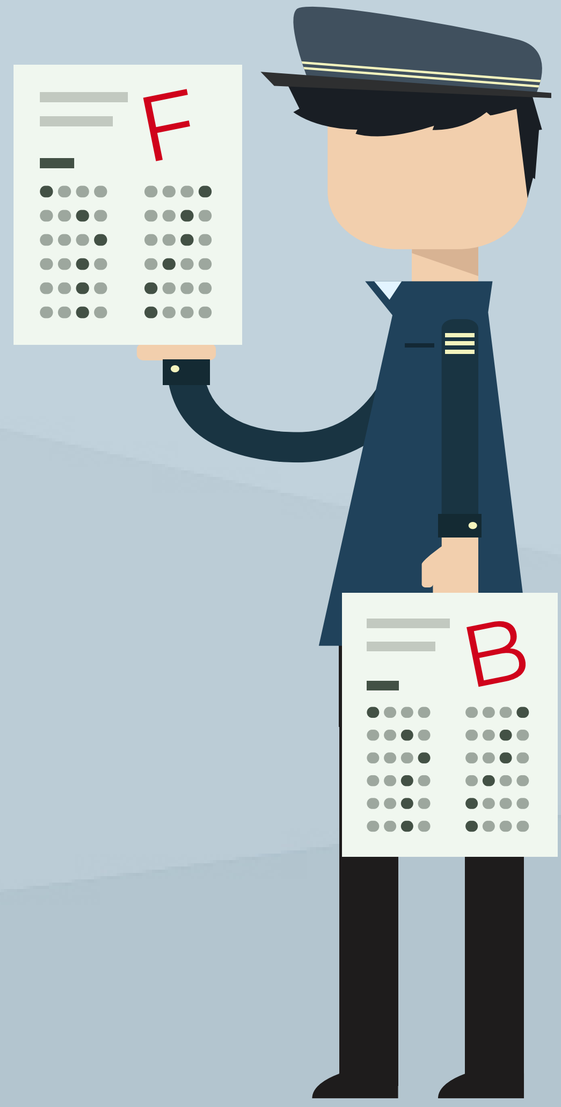
Trend 3

Some categories of aviation weather products yeilded higher scores than others

- Winds Aloft scores were high (m = 86%)
- Many scores were low:
  - Satellite (m = 58%)
  - TAF (m = 57%)
  - METAR (m = 55%)
  - Station Plots (m = 39%)
- Many of these low scoring products are featured in new overlay displays



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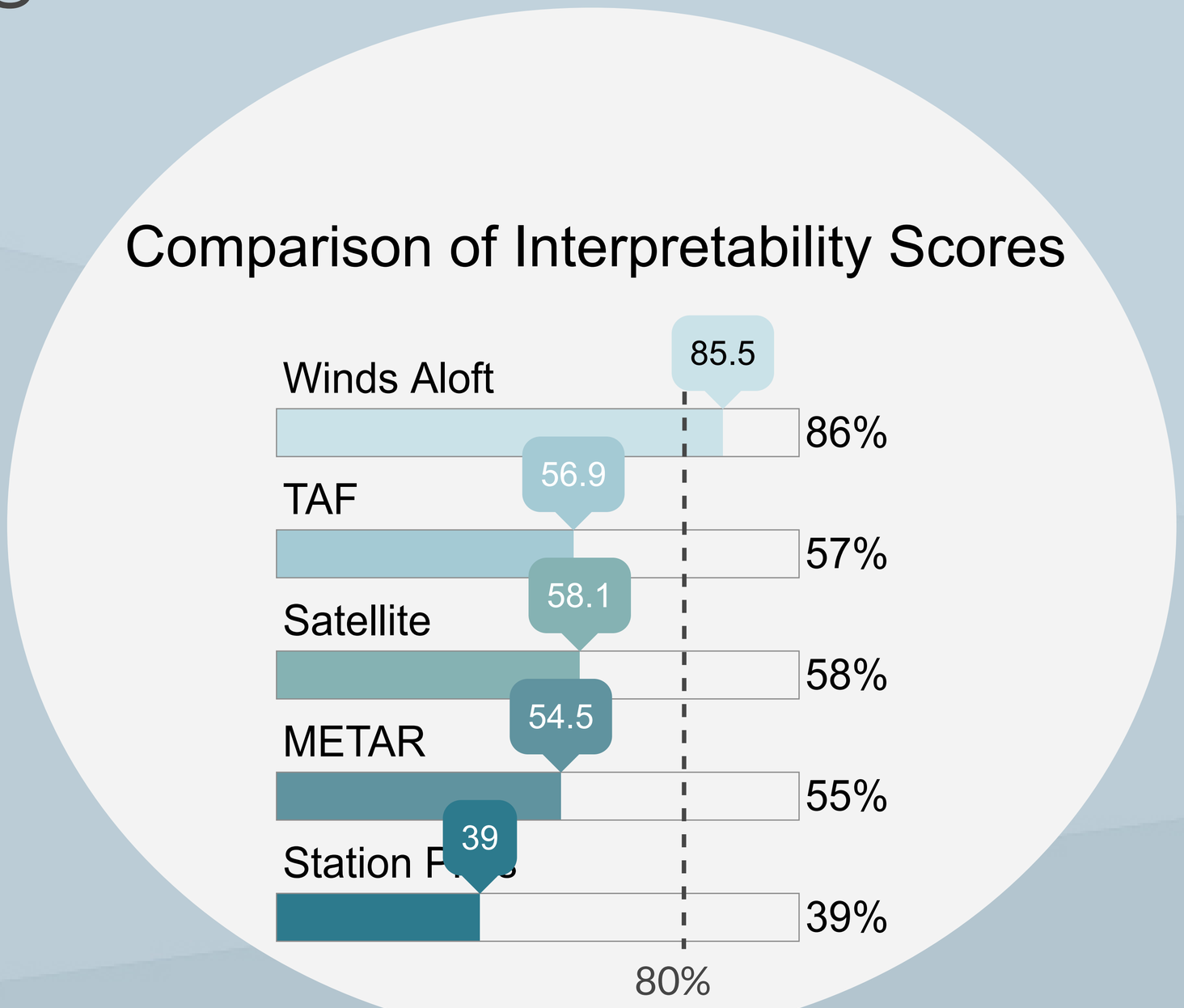

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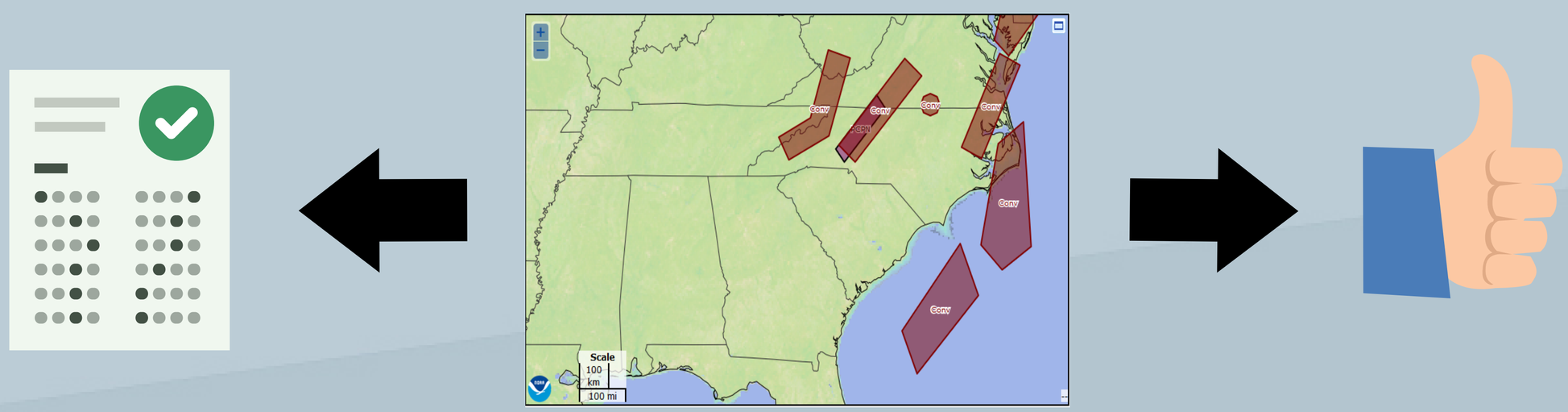
Trend 4

The interpretability scores align with results from external usability assessments

- Remy (2017) used a modified System Usability Scale to evaluate the Aviation Weather Center website
- Usability scores in this study trended in the same direction as interpretability scores from Blickensderfer et. al (2017) study



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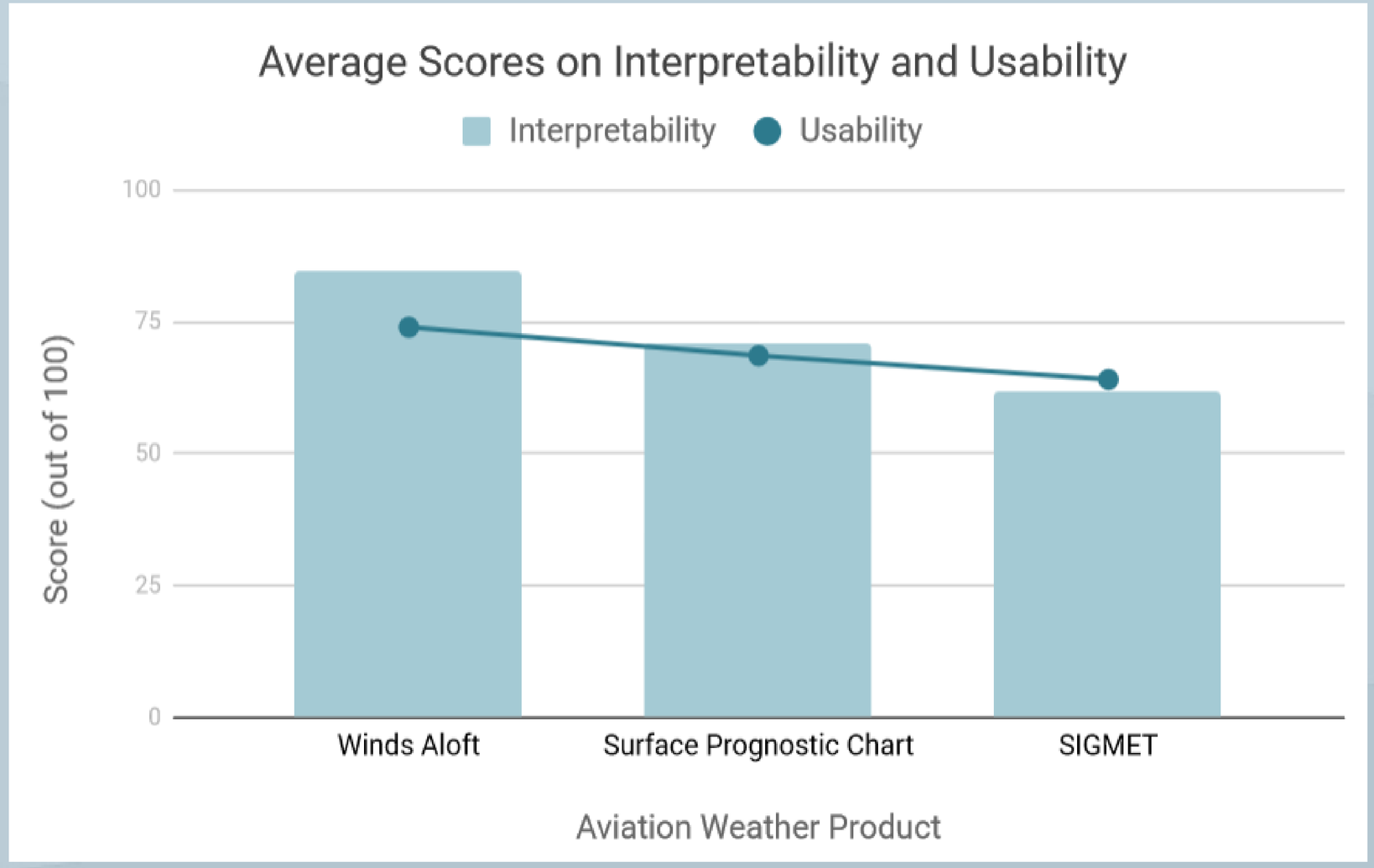

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Summary

Trends reveal the following:

1. Flight experience has a limited effect on interpretability

2. Pilots do not understand Weather Radar displays

3. Some categories of aviation weather products yielded higher scores

4. Interpretation scores align with external usability assessments

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Conclusion

Pilots struggle to interpret aviation weather displays

- Can lead to inadequate understanding of current and forecasted weather

- GA flights that encounter hazardous weather typically end in fatalities

Imperative that new displays are created with the user at the forefront

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Thank You!

References

Beringer, D. B., & Ball, J. D. (2004). *The effects of NEXRAD graphical data resolution and direct weather viewing on pilots' judgments of weather severity and their willingness to continue a flight* (No. DOT/FAA/AM-04/5). FEDERAL AVIATION ADMINISTRATION OKLAHOMA CITY OK CIVIL AEROMEDICAL INST.

Blickensderfer, B., Lanicci, J., Guinn, T., Thomas, R., King, J., & Ortiz, Y. (2017). Assessing general aviation pilots understanding of aviation weather products. *The International Journal of Aerospace Psychology*, *27*(3-4), 79-91. doi:10.1080/24721840.2018.1431780

Remy, B. (2017). Exploring Usability in Web-Based Aviation Weather: An Assessment of the Aviation Weather Center Website (Doctoral dissertation).